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# Characterization of finger millet [*Eleusine coracana* (L.) Gaertn.] germplasm for morphological parameters under field conditions

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**Abstract:** The trial was conducted at the research block of Crop Improvement, GBPUAT, Hill Campus, Ranichauri using randomized block design (RBD) to characterize finger millet germplasm for morphological characters viz., plant height, flag leaf length, number of tiller plant$^{-1}$, number of finger ear $^{-1}$, ear length, no. of grain finger$^{-1}$, no. of grain ear $^{-1}$ and grain yield plant$^{-1}$. Among all germplasms, number of finger ear $^{-1}$, number of grain finger$^{-1}$ and grain yield plant$^{-1}$(g) had recorded highest in VL 149 which were 9.96, 150.66, 2.63 g respectively. The germplasm GEC 1406 attained lowest plant height (75.89 cm), GEC 961 had recorded higher flag leaf length (40.96 cm), GEC 268 had recorded maximum number of tiller Plant$^{-1}$ (3.30), GEC 199 had recorded higher ear length (9.20 cm), GEC 1044 had recorded maximum number of grain ear$^{-1}$ (663) among all germplasm of finger millet. This study is helpful to identify superior germplasm so they can be used for further finger millet crop improvement programs.

**Keywords:** Characterization, *Eleusine coracana,* Finger millet, Germplasm

## INTRODUCTION

Finger millet (*Elusine coracana* (L.) Gaertn.) popularly known as 'Ragi' or 'Mandua", belongs to family 'Poaceae'. Eleusine, the generic name, which is a Greek word meaning 'Goddess of Cereals", is supposed to have originated in the Ethiopian highlands and was introduced into India approximately 3000 years ago. Finger millet is the most important crop from the nutritional as well as fodder point of view. It ranks third in importance among millets after pearl millet (*Pennisetum glaucum*) and foxtail millet (*Setaria italica*) in semi arid tropics (SAT) and subtropics of the world (Reddy *et al.*, 2009). Finger millet is highly adaptable to higher elevations and is grown in Himalaya upto an altitude of 3000 m asl (Bisht and Singh, 2009). Finger millet has high yield potential and grains can be stored for years without storage pests, which make it a perfect food grain for famine prone areas (National Research Council, 1996). Plant height, number of cluster per plant and number of pods per plant exhibit high heritability coupled with high to moderate genetic advance as percent of mean (>20), which may be improved through simple plant selection according to Mehandi *et al.* (2013).

The availability of genetic diversity is pre-requisite for genetic improvement of a crop. There is a great genetic variation among varieties and germplasm of finger millet. Besides the availability of genetic diversity, their characterization is essential for the effective utilization in the crop improvement (Upadhyaya *et al.,* 2007). Therefore, the present study was conducted to characterize the finger millet *E. coracana* germplasms for morphological parameters under field conditions.

## MATERIALS AND METHODS

The experimental material for the study consisted of thirty finger millet entries, these were obtained from project co-ordinating unit, Small millet, Gandhi Krishi Vignan Kendra, Bangalore and International Crops Research Institute for Semi-Arid Tropics, Hyderabad. The trial was conducted at the research block of Crop Improvement, Govind Ballabh Pant University of Agriculture and Technology, Hill Campus, Ranichauri using randomized block design (RBD) during kharif season of 2010. The experimental data were analyzed statistically as per the method described by Gomez and Gomez (1984) for Randomized Block Design (RBD). The interpretation of results was based on 'F-test' at 5% level of significance. The altitude of the site is 2100 m asl and located at $30^{0}$15' N latitude and $78^{0}$30'E longitude under mid hill zones of Uttarakhand, India. The germplasm were used to characterize on the basis of plant growth characters like plant height, flag leaf length, Number of tiller plant$^{-1}$, Num-

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**Table1.** Morphological characters of different genotypes of finger millet [*Eleusine coracana* (L.) Gaertn.].

| Characters / Genotypes | Plant height (cm) | Flag leaf length (cm) | No. of tiller plant$^{-1}$ | No. of finger ear$^{-1}$ | Ear length (cm) | No. of grain finger$^{-1}$ | No. of grain ear$^{-1}$ | Grain yield Per plant (g) |
|---|---|---|---|---|---|---|---|---|
| GEC 11 | 84.93 | 25.43 | 2.86 | 7.06 | 7.36 | 103.33 | 312.53 | 1.50 |
| GEC 37 | 91.80 | 35.53 | 2.26 | 7.90 | 6.03 | 118.86 | 630.40 | 1.35 |
| GEC 103 | 107.26 | 33.76 | 2.10 | 7.26 | 7.30 | 121.93 | 322.00 | 2.27 |
| GEC 122 | 88.83 | 31.73 | 2.23 | 7.10 | 5.00 | 103.40 | 622.03 | 1.62 |
| GEC 123 | 84.76 | 27.73 | 1.80 | 7.23 | 5.40 | 108.00 | 478.06 | 1.68 |
| GEC 142 | 88.50 | 35.33 | 2.83 | 7.26 | 6.03 | 121.33 | 433.66 | 0.91 |
| GEC 199 | 105.53 | 35.90 | 2.46 | 8.30 | 9.20 | 94.66 | 205.26 | 1.17 |
| GEC 246 | 94.80 | 33.06 | 3.23 | 9.33 | 6.40 | 86.66 | 249.06 | 0.92 |
| GEC 258 | 90.73 | 38.90 | 3.23 | 7.13 | 5.13 | 112.33 | 308.53 | 1.43 |
| GEC 268 | 95.93 | 33.56 | 3.30 | 8.43 | 7.53 | 128.33 | 312.33 | 1.42 |
| GEC 394 | 88.56 | 39.03 | 3.00 | 7.93 | 8.13 | 117.56 | 352.66 | 2.03 |
| GEC 420 | 95.16 | 33.36 | 2.26 | 7.63 | 7.66 | 114.80 | 469.33 | 1.74 |
| GEC 532 | 79.70 | 36.66 | 1.76 | 8.23 | 8.26 | 97.33 | 414.46 | 1.19 |
| GEC 593 | 102.80 | 35.63 | 1.36 | 8.36 | 7.30 | 108.00 | 422.26 | 1.22 |
| GEC 863 | 84.56 | 36.30 | 3.23 | 8.80 | 7.53 | 115.66 | 405.70 | 1.12 |
| GEC 894 | 80.20 | 35.23 | 1.66 | 6.40 | 6.43 | 128.00 | 495.40 | 1.55 |
| GEC 961 | 78.86 | 40.96 | 2.53 | 8.66 | 7.43 | 105.66 | 435.33 | 1.83 |
| GEC 1044 | 86.70 | 29.36 | 2.76 | 9.16 | 7.03 | 121.66 | 663.00 | 1.52 |
| GEC 1406 | 75.89 | 32.16 | 2.10 | 8.30 | 5.93 | 81.66 | 136.00 | 0.72 |
| IE 234 | 104.40 | 35.13 | 1.43 | 7.46 | 6.73 | 101.33 | 460.33 | 1.19 |
| IE 285 | 104.70 | 33.43 | 1.43 | 7.23 | 7.06 | 102.73 | 279.96 | 1.35 |
| IE 581 | 90.06 | 30.66 | 1.70 | 7.40 | 3.86 | 103.13 | 304.06 | 1.78 |
| IE 603 | 86.346 | 27.83 | 1.66 | 6.53 | 4.03 | 113.46 | 330.00 | 1.05 |
| IE 728 | 84.90 | 33.16 | 1.50 | 5.86 | 4.53 | 105.93 | 420.66 | 1.03 |
| IE 847 | 77.06 | 31.50 | 1.76 | 7.60 | 3.73 | 109.06 | 409.33 | 1.01 |
| PRM 2 (C) | 101.23 | 31.33 | 2.73 | 7.03 | 5.26 | 119.40 | 504.26 | 2.47 |
| PRM 901 | 96.43 | 35.53 | 1.93 | 5.66 | 6.03 | 102.33 | 310.00 | 1.71 |
| PRM 6108 | 100.96 | 39.10 | 1.53 | 7.40 | 8.23 | 112.00 | 323.33 | 2.21 |
| PRM 9003 | 120.66 | 28.90 | 1.83 | 6.86 | 5.30 | 102.46 | 426.66 | 1.83 |
| VL 149(C) | 105.33 | 29.36 | 2.10 | 9.96 | 8.13 | 150.66 | 508.33 | 2.63 |
| gm | 92.59 | 33.52 | 2.22 | 7.65 | 6.46 | 110.39 | 398.16 | 1.51 |
| SE(±) | 1.02 | 0.83 | 0.18 | 0.32 | 0.58 | 1.67 | 8.40 | 0.16 |
| CD (0.05) | 2.90 | 2.35 | 0.51 | 0.91 | 1.64 | 4.73 | 23.80 | 0.45 |

ber of finger ear$^{-1}$, ear length, number of grain finger$^{-1}$, number of grain ear$^{-1}$ and grain yield plant$^{-1}$ and these characters were taken according to morphological descriptor (IBPGR,1985) under mid hill condition of Uttarakhand.

## RESULTS AND DISCUSSION

The results of the analyses revealed that significant differences were found among all parameters at 5% level of significance. The maximum plant height was observed in PRM 9003, which was significantly higher than other germplasm while lower value observed in GEC 1406 which was statistically at par with IE 847 and GEC 961. Joshi and Mehra (1989) reported significant variation for plant height, finger length, number of finger and grain yield but observe non significant variation for number of effective tillers. Flag leaf length was observed maximum in GEC 961 which was statistically at par with GEC 258, GEC 394 while lowest value was found in GEC 11.

Number of tiller plant$^{-1}$ observed maximum in GEC 268 which is statistically at par with GEC 142, GEC 246, GEC 258, GEC 394 and GEC 863 while the lowest value observed in GEC 593. The number of finger ear $^{-1}$ was maximum in VL 149 (C) and lowest in case of PRM 901. More the number of fingers in the mature ears means that accession will definitely yield higher grain yield (Haradari *et al.,* 2011).

Number of grains finger $^{-1}$ was observed maximum in VL 149 (C) which was significantly superior among all germplasms, while lowest value observed in GEC 1406. The maximum ear length was found in GEC 199 it was statistically at par with GEC 394, GEC 420, GEC 532, GEC 863, PRM 6108 and VL 149 (C) while the lowest value was observed in IE 847. Number of grain ear $^{-1}$ was found maximum in GEC 1044 which is significantly superior than other germplasms. However the lowest value observed in GEC 1406.Grain yield

plant$^{-1}$ was found maximum in VL 149 which is at par with PRM 2, GEC 103 and PRM 6108, while minimum grain yield was found in GEC 1406. Grain yield per plant had positive association with finger number per ear and ear weight per plant (Sonnad *et al.* 2008). Our findings indicated that grain yield per plant was positively correlated with number of finger per ear and number of grain per finger which are in accordance to findings of Sonnad *et al.* (2008). In present study, out of all germplasms used, PRM 9003, GEC 961, VL 149, GEC 199 and GEC 1044 show better performance in plant growth and yield contributing characters of finger millet, *Eleusine coracana*.

## Conclusion

The study revealed that plant height, flag leaf length, no. of tiller plant$^{-1}$, no. of finger ear $^{-1}$, ear length, no. of grain per finger and no. of grain ear $^{-1}$ and grain yield plant$^{-1}$ were observed maximum in PRM 9003, GEC 961, GEC 268, GEC 1044, GEC 268, VL 149 (C), GEC 199, VL 149 (C), GEC 199 and GEC 1044 respectively. Germplasms showed wide range of diversity and yield contributing characters and would be helpful in identifying superior genotypes for traits which were taken under this study.

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